



NOAA Science Briefing on Lake Erie Harmful Algal Blooms

Hosted by the Office of U.S. Congresswoman Marcy Kaptur

9th Congressional District of OH with 141 miles of Lake Erie coastline

WHEN:

Monday, June 15, 2015, 2:00 - 3:00 p.m. ET

TO JOIN:

Dial-In: [**800-369-2020**](tel:800-369-2020)

Passcode: GREAT LAKES



Webinar:

[**https://www.mymeetings.com/nc/join.php?i=PW4267407&p=GREAT%20LAKES&t=c**](https://www.mymeetings.com/nc/join.php?i=PW4267407&p=GREAT%20LAKES&t=c)

Slides and audio available for download: [**http://go.usa.gov/3PGTT**](http://go.usa.gov/3PGTT)

To ensure a space on the call, please RSVP to [**john.ewald@noaa.gov**](mailto:john.ewald@noaa.gov)



Panel of Experts

Timothy Davis, Ph.D., Molecular HAB Ecologist, NOAA Great Lakes Environmental Research Laboratory

Rick Stumpf, Ph.D., Oceanographer, NOAA National Centers for Coastal Ocean Science

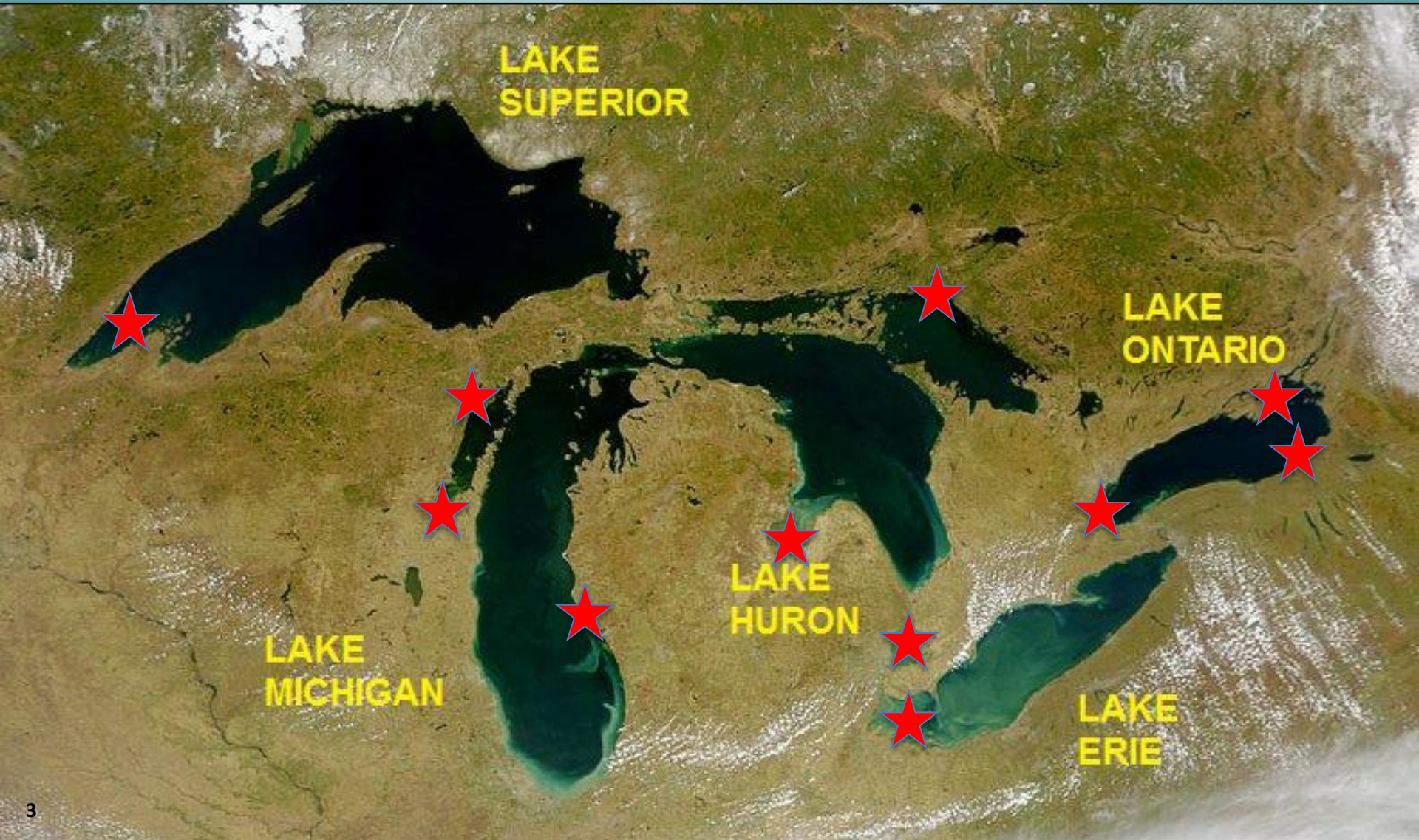
Eric Anderson, Ph.D., Physical Oceanographer, NOAA Great Lakes Environmental Research Laboratory

Tom Johengen, Ph.D., Research Scientist, Cooperative Institute for Limnology and Ecosystems Research

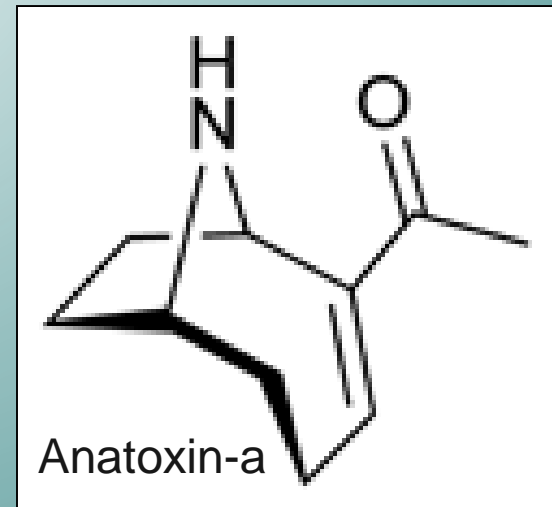
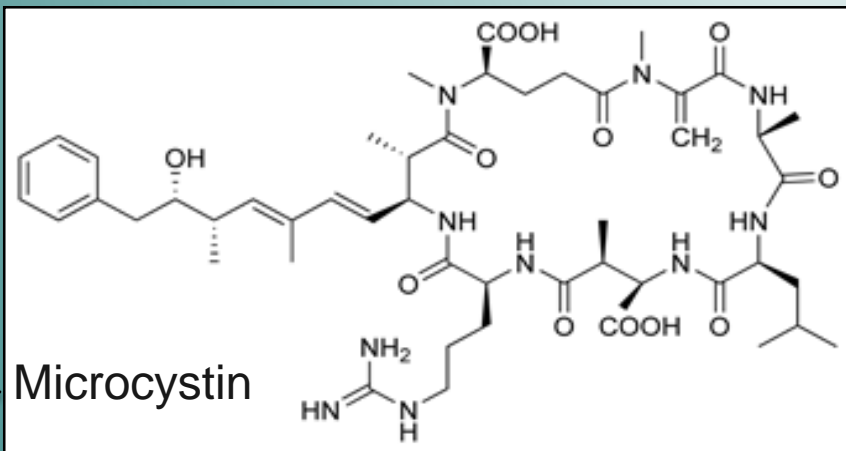
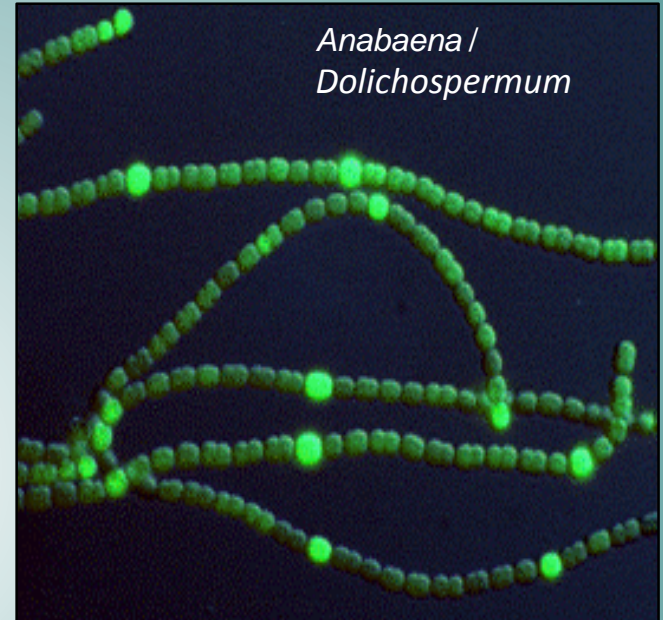
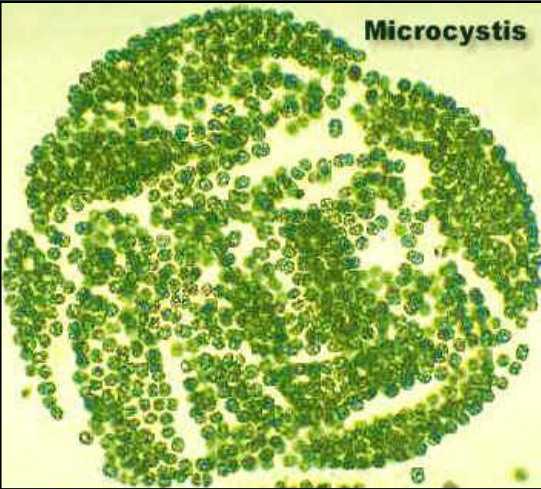
Sonia Joseph Joshi, M.S., Communications and Outreach Specialist, Cooperative Institute for Limnology and Ecosystems Research

Steve Ruberg, M.S., Observing Systems and Advanced Technology Branch Chief, NOAA Great Lakes Environmental Research Laboratory

HABs in the Great Lakes basin



Toxin producing cyanobacteria of Lake Erie



Caused the 2014 Toledo water crisis

Ecological and social impacts of HABs

- Drinking water impacts
- Peak during tourism, fishing, recreational months
- Decrease light penetration
- Disrupt the food webs
- May trigger low oxygen events & result in fish kills
- Climate change likely to make blooms worse





HABs Research: Multi-disciplinary Team



Monitoring & Experiments

Tim Davis

Tom Johengen

Remote Sensing

Steve Ruberg

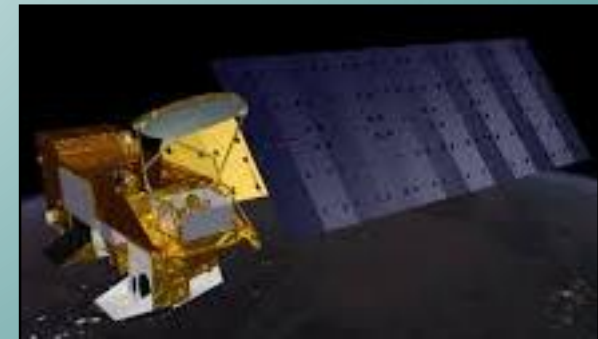
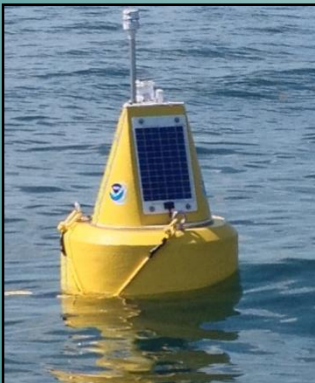
Rick Stumpf

Modeling

Eric Anderson

Communications

Sonia Joseph Joshi



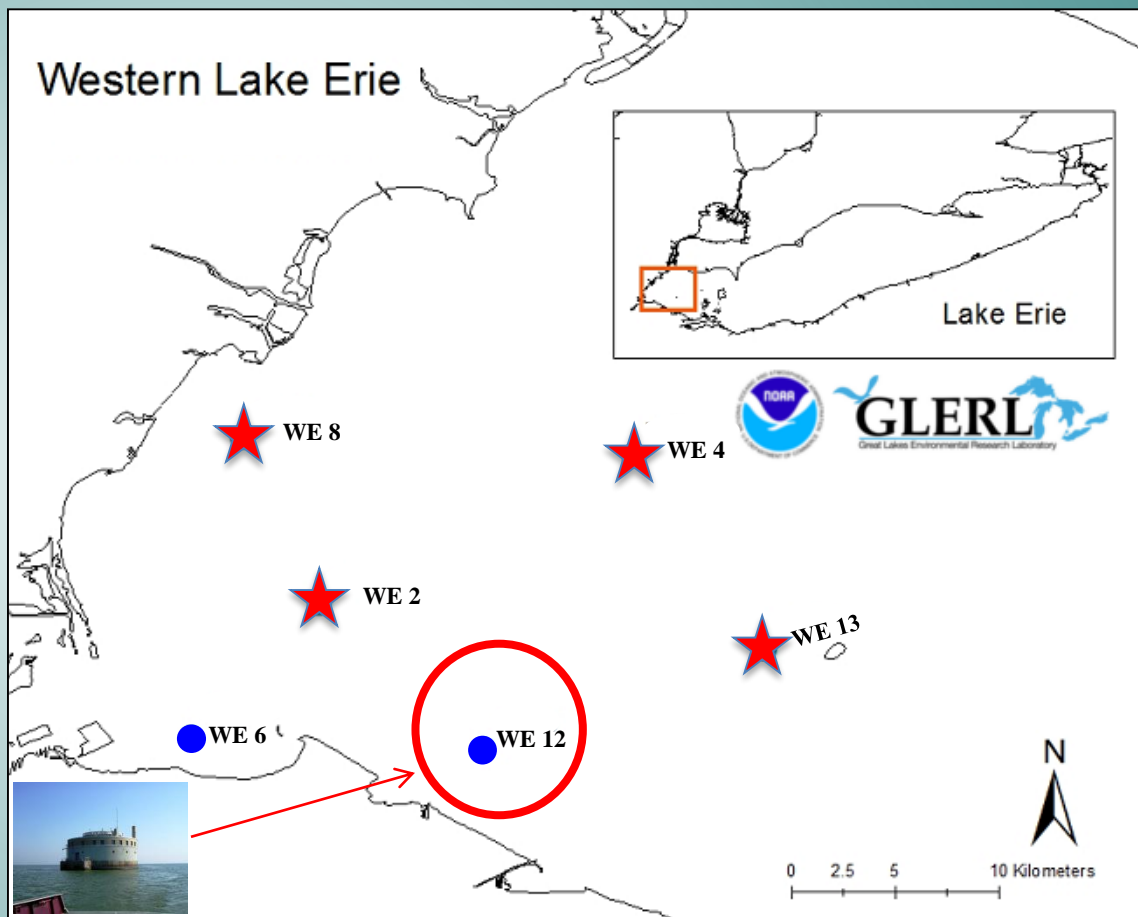
Weekly HAB sampling & Real-time monitoring

- June – October
- Water samples at different depths
- Ground-truth for remote sensing (bloom extent, distribution)

Parameters

Sensors

- Turner C6, Cyclops sensors
- **YSI EXO sondes**
- Chlorophyll, Phycocyanin, Turbidity, CDOM
- **Wetlabs Cycle** –inorganic P

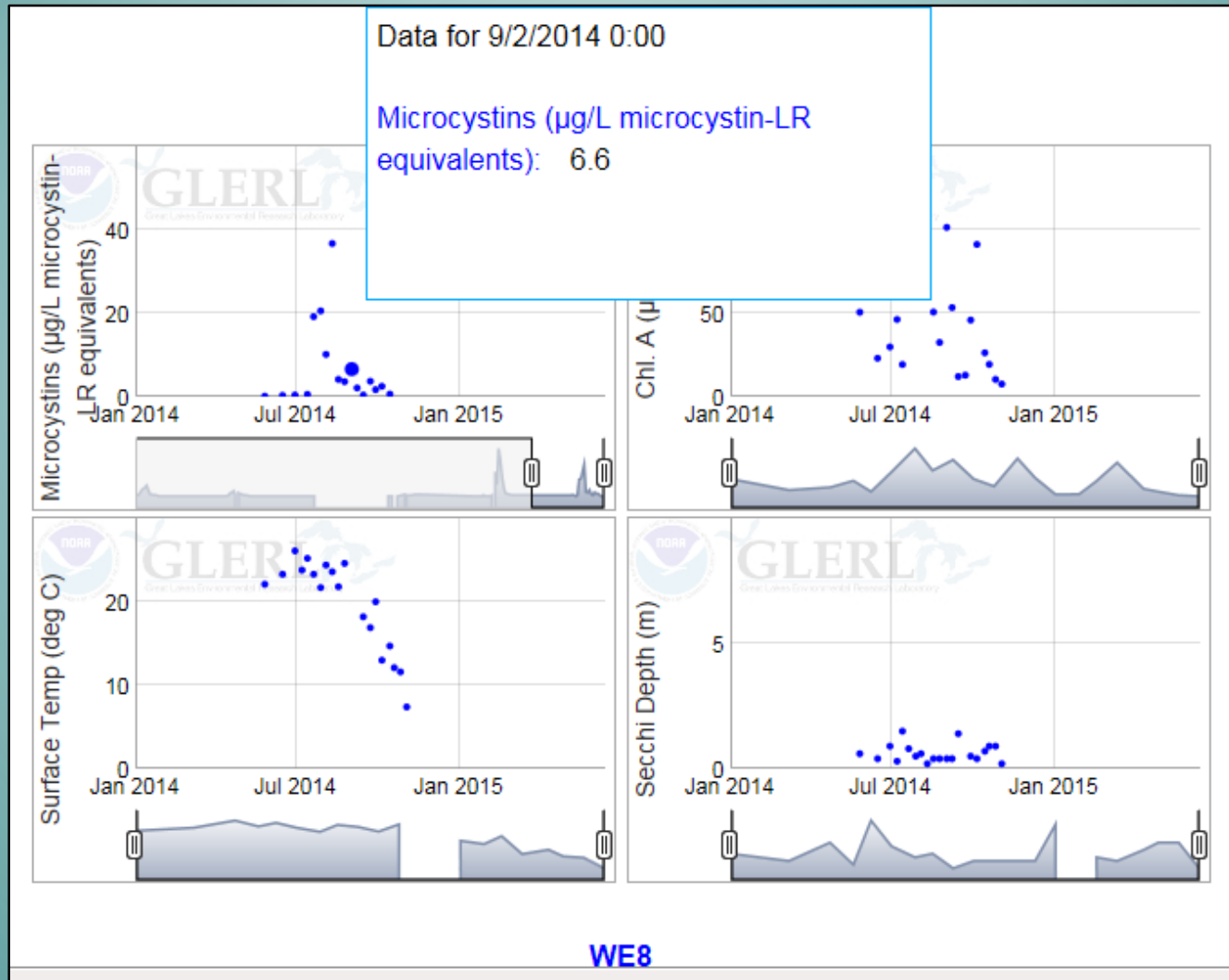


★ = Real-time observation station & weekly sampling in 2015

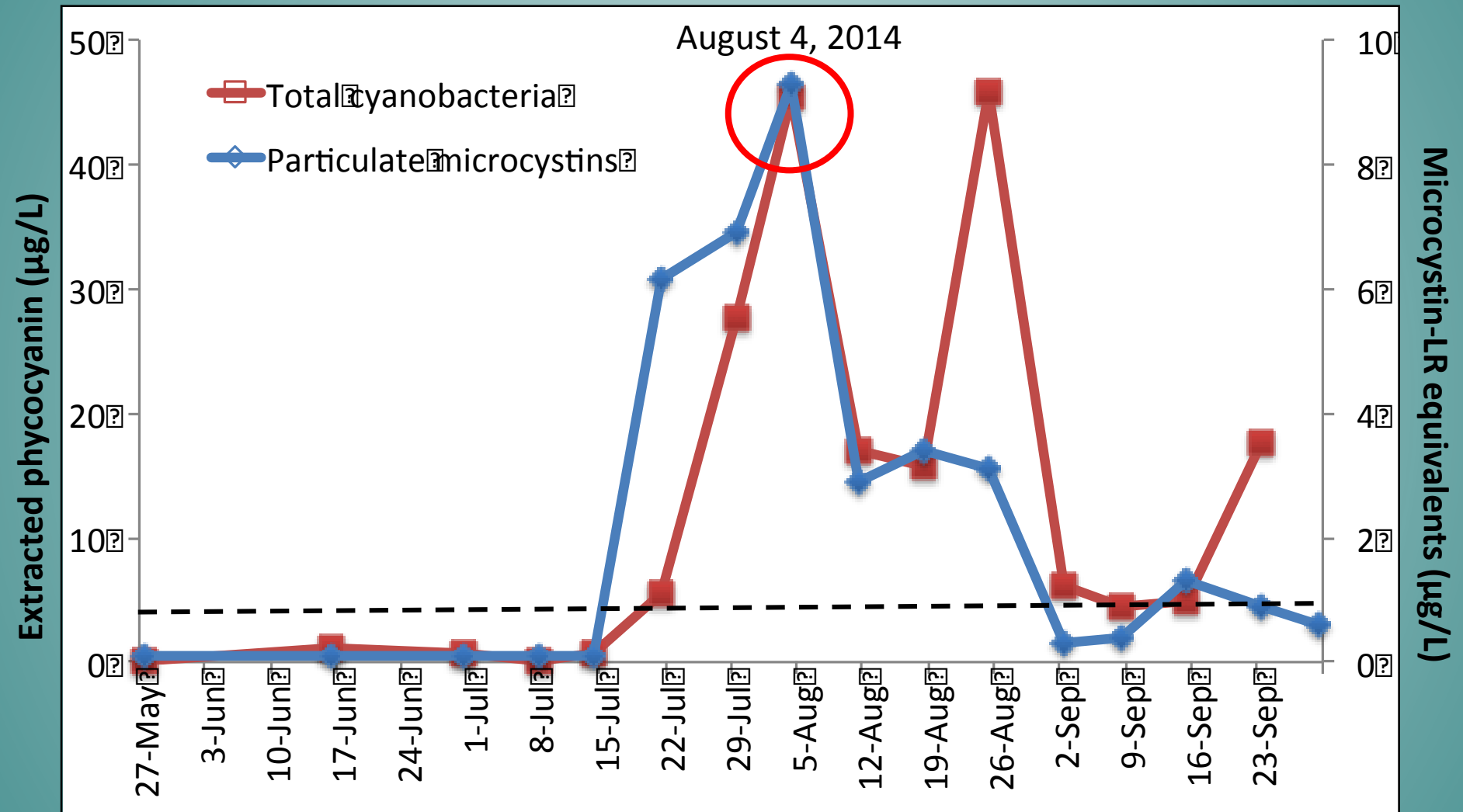


Lake Erie monitoring & toxin data on-line

<http://www.glerl.noaa.gov/res/waterQuality/WLEMicrocystin.html>



Nitrogen plays a key role in bloom toxicity



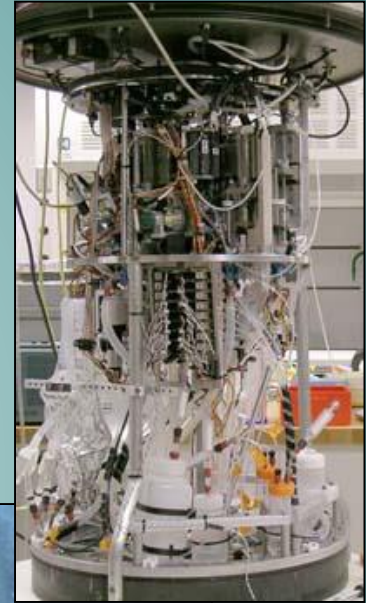
--- = WHO guideline level for safe drinking water



Environmental Sample Processor

New instrument will improve tracking HABs toxicity

- Newly acquired with GLRI funding
- 2015 Testing Phase
- Will track blooms toxicity at higher resolution
- Will advance the development of HABs forecasting models



Photos: Monterey Bay
Aquarium Research Institute



2015 = 7th year of NOAA Lake Erie Bulletins

Distributed twice a week July- October:

http://www2.nccos.noaa.gov/coast/lakeerie/bulletin/bulletin_current.pdf

Sign up to receive bulletins:

<http://www2.nccos.noaa.gov/coast/lakeerie/bulletin/Subscribe/subscribe.html>





Components: Analysis and forecast



Experimental Lake Erie Harmful Algal Bloom Bulletin

National Centers for Coastal Ocean Science and Great Lakes Environmental Research Laboratory

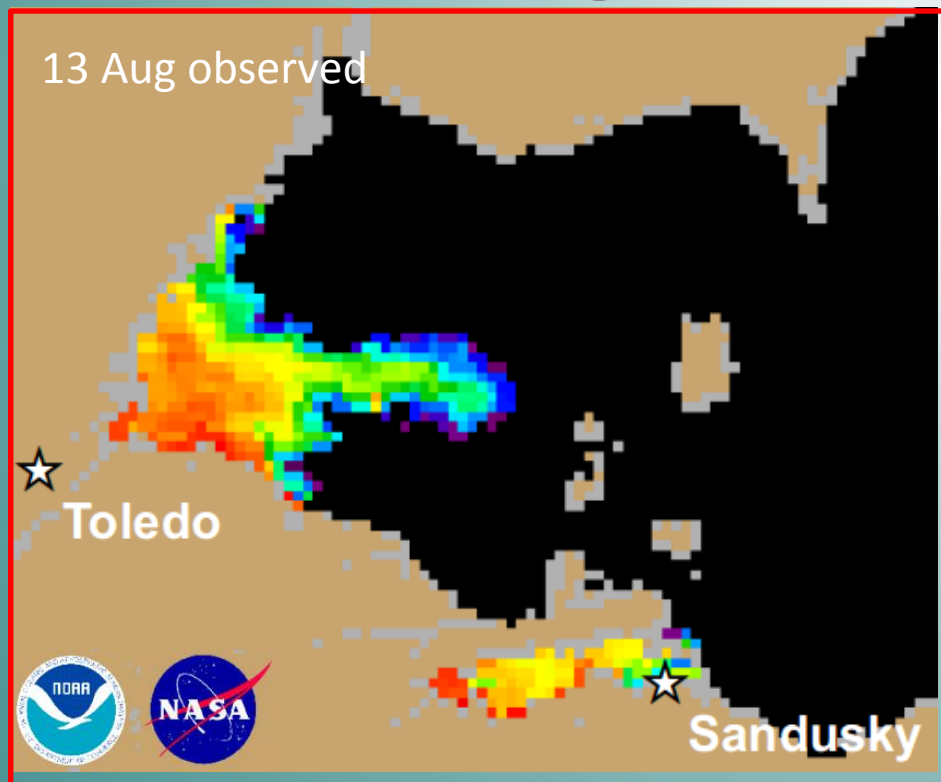
14 August 2014, Bulletin 13

The bloom moved slightly eastward from Sunday (10 Aug) to yesterday (13 Aug). High winds (> 15 knots) kept the bloom mixed in the water column yesterday, reducing the surface concentration seen by satellite. Some mixing is expected again today. GLERL reported microcystin Monday from 29 ug/L just outside of Maumee Bay to 37 ug/L inside the Bay; 9 ug/L was observed southeast of Monroe.

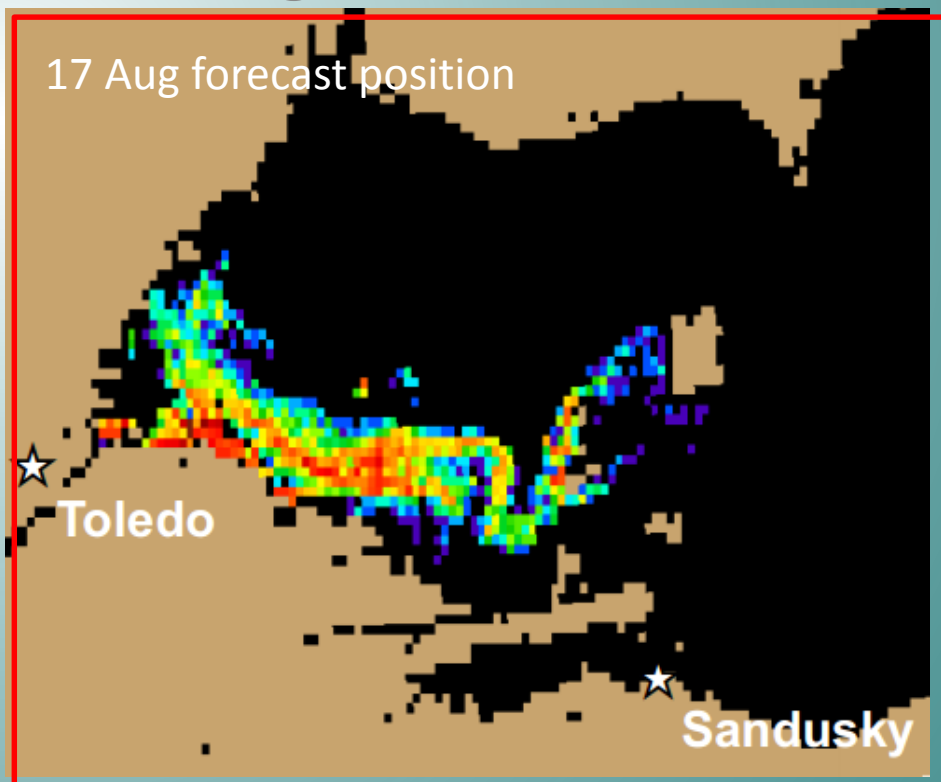
13 Aug observed

17 Aug forecast

13 Aug observed



17 Aug forecast position



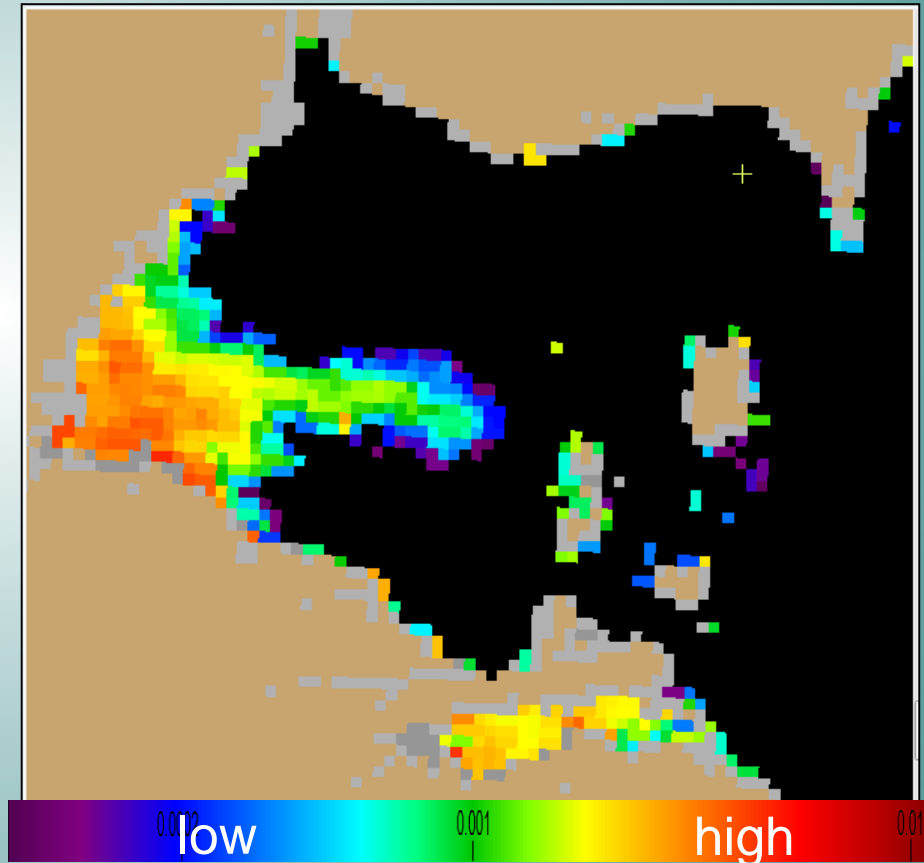


Satellite imagery: Cyano chlorophyll index (CI) biomass identifies blooms; we are not guessing about “true color”

13 Aug 2014



True color

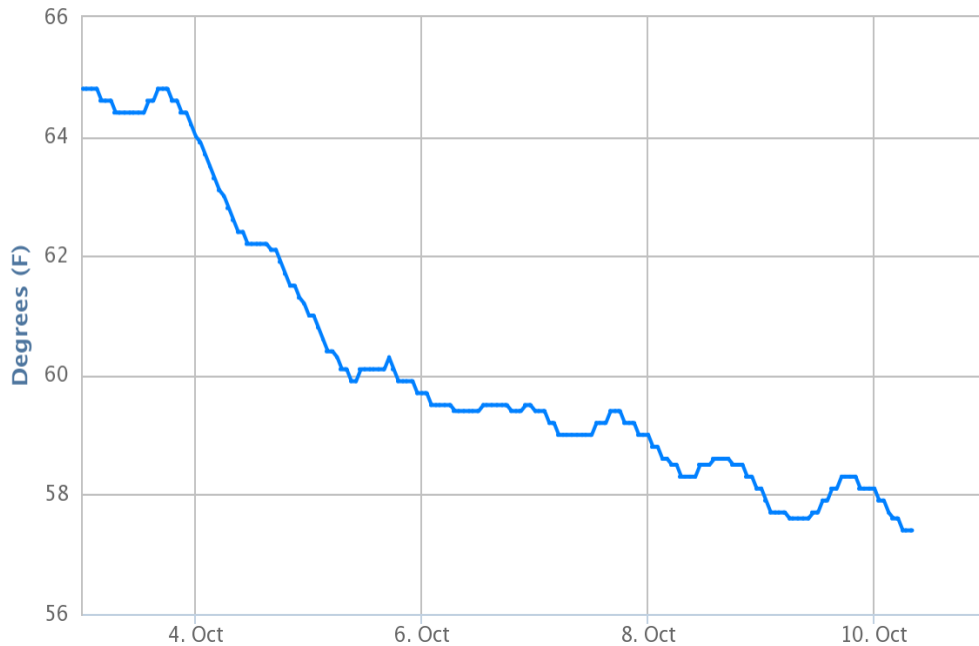


**MODIS Cyano Index
(CI)**



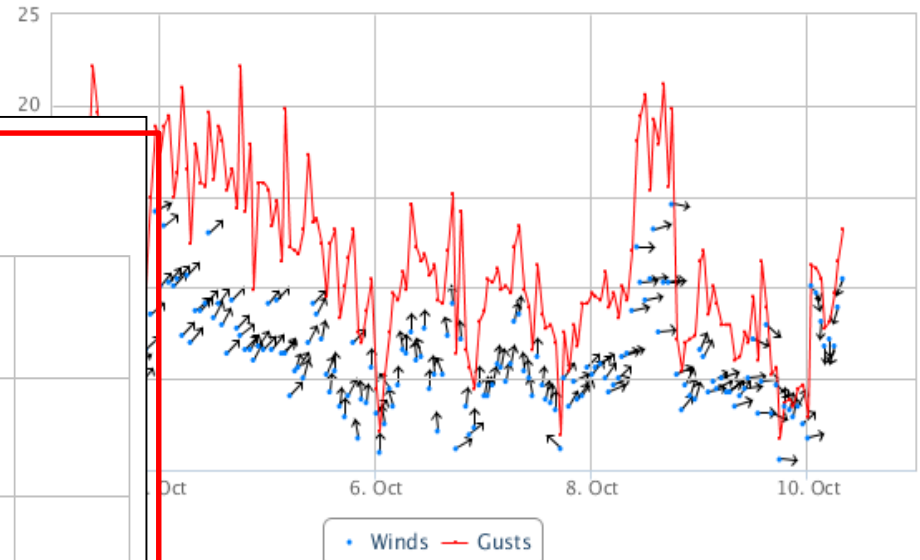
Wind and Water Temperature Influence Bloom Growth

NOAA/NOS/CO-OPS
Water Temperature at 9063079, Marblehead OH
From 2014/10/03 00:00 LST to 2014/10/10 23:59 LST



NOAA/NOS/Center for Operational Oceanographic Products and Services

NOAA/NOS/CO-OPS
Winds at 9063079, Marblehead OH
From 2014/10/03 00:00 LST to 2014/10/10 23:59 LST



NOAA/NOS/Center for Operational Oceanographic Products and Services

Blooms stop growing at 15 C (59 F)



New this year: Lake Erie HABs Early Season Projection made on 8 June 2015

Available online here:

http://www2.nccos.noaa.gov/coast/lakeerie/bulletin/bulletin_current.pdf

Lake Erie Harmful Algal Bloom Early Season Projection

NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE AND THE NATIONAL CENTER FOR WATER QUALITY RESEARCH



8 June 2015, Projection 04

The severity of the western Lake Erie cyanobacterial harmful algal bloom (HAB) is dependent on phosphorus inputs from March 1st through July 31st, henceforth called the loading season. This new product projects the bloom severity based on the combination of current measurements of discharge and phosphorus loading from the Maumee River for the season to date with historical records from past years to estimate the remainder of the loading season.



Based on data from March 1 to this week, the extensive severe blooms observed in 2011 and 2013 are not projected to occur this year. So far, this spring has been relatively dry, resulting in less discharge and lower phosphorus loads into the western basin. Heavy rains on May 31 have caused a slight increase in the projection over last week. The range of uncertainty continues to decrease.

The uncertainty will decrease over time as the loading season progresses.

This experimental product involves the Maumee River phosphorus load data from Heidelberg University's [National Center for Water Quality Research](http://www2.nccos.noaa.gov/coast/lakeerie/bulletin/bulletin_current.pdf) and the western Lake Erie bloom severity models by NOAA's [National Center for Coastal Ocean Science](http://www2.nccos.noaa.gov/coast/lakeerie/bulletin/bulletin_current.pdf).

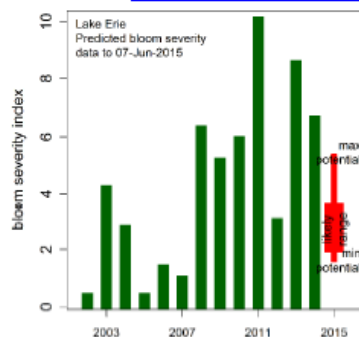


Figure 1. Projected bloom compared to previous years. The wide bar is the likely range of severity based on data from the last 15 years. The narrow bar is the potential range of severity, indicating that a bloom of severity of 6 remains possible (as occurred in 2008-2010). While a non-bloom year is unlikely, the projection still remains below the severe blooms of the last few years.

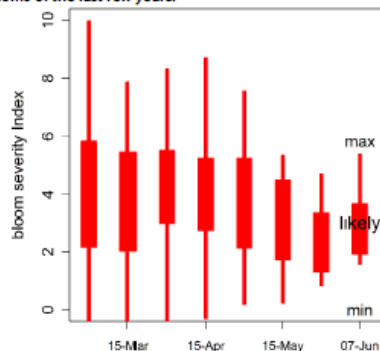


Figure 3: Loading season projections for 2015 starting March 1st, where a bloom severity of 10 indicates the record-breaking bloom of 2011. The event caused by intense rainfall on May 31 caused a slight increase in the projected bloom. Large flow events in the next month could cause an additional increase in the projection.

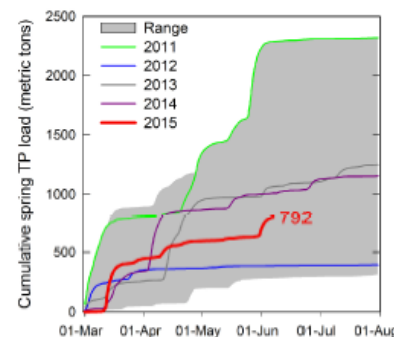


Figure 2. Cumulative total phosphorus projected to June 7, compared to the range from 2000-2014 (gray and the most recent past years). The red line and text denotes data through June 2. Projection is based on past date and discharge through June 7. Nutrient loads are below those of 2013 and 2014.

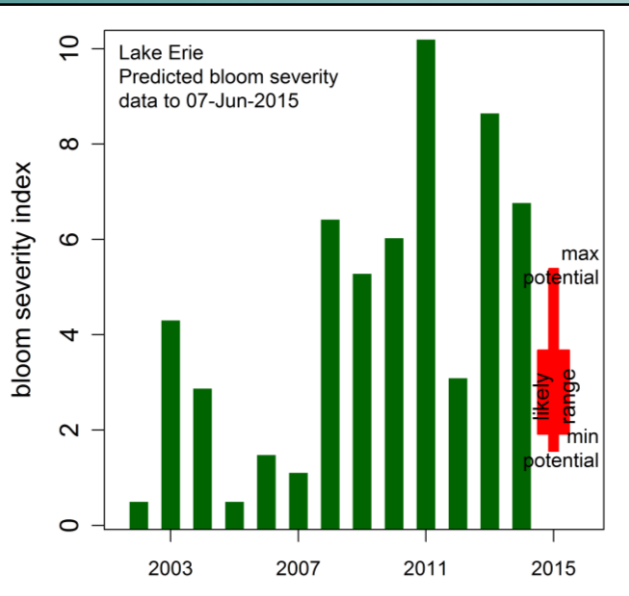


Figure 4: MODIS Terra true color image from June 4, 2015. Sediment is still stirred up in the lake from the high (30 knot) winds on May 31, and moderately high winds (10-15 knots) of the previous few days. The darker brown plume of water from the Maumee River is visible in the far southwest corner of the lake. Additional processing has shown that the Sandusky Bay has a bloom of the cyanobacteria, *Planktothrix*, confirmed by Bowling Green State University. This bloom occurs each year in the bay, and does not indicate any unusual conditions. Otherwise, there are no blooms in Lake Erie.

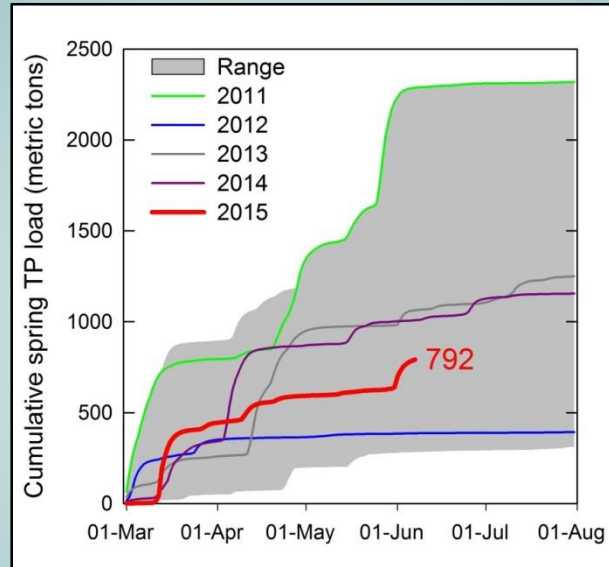
Development of HABs Early Season Projection

in collaboration with

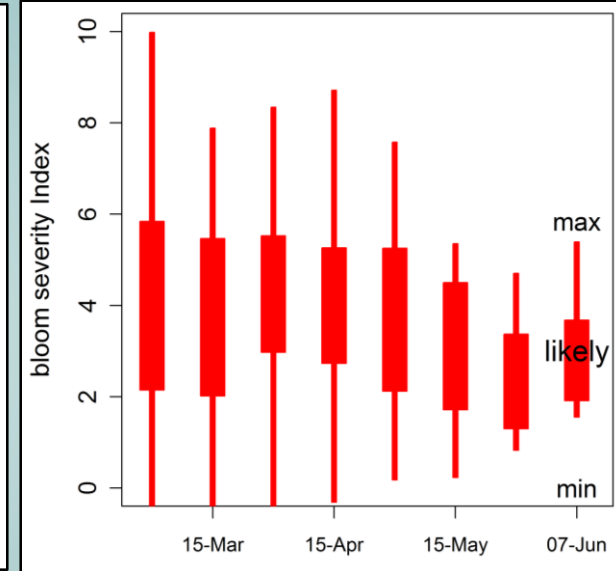
HEIDELBERG UNIVERSITY



More uncertainty
than upcoming July
seasonal forecast
(based on less data)



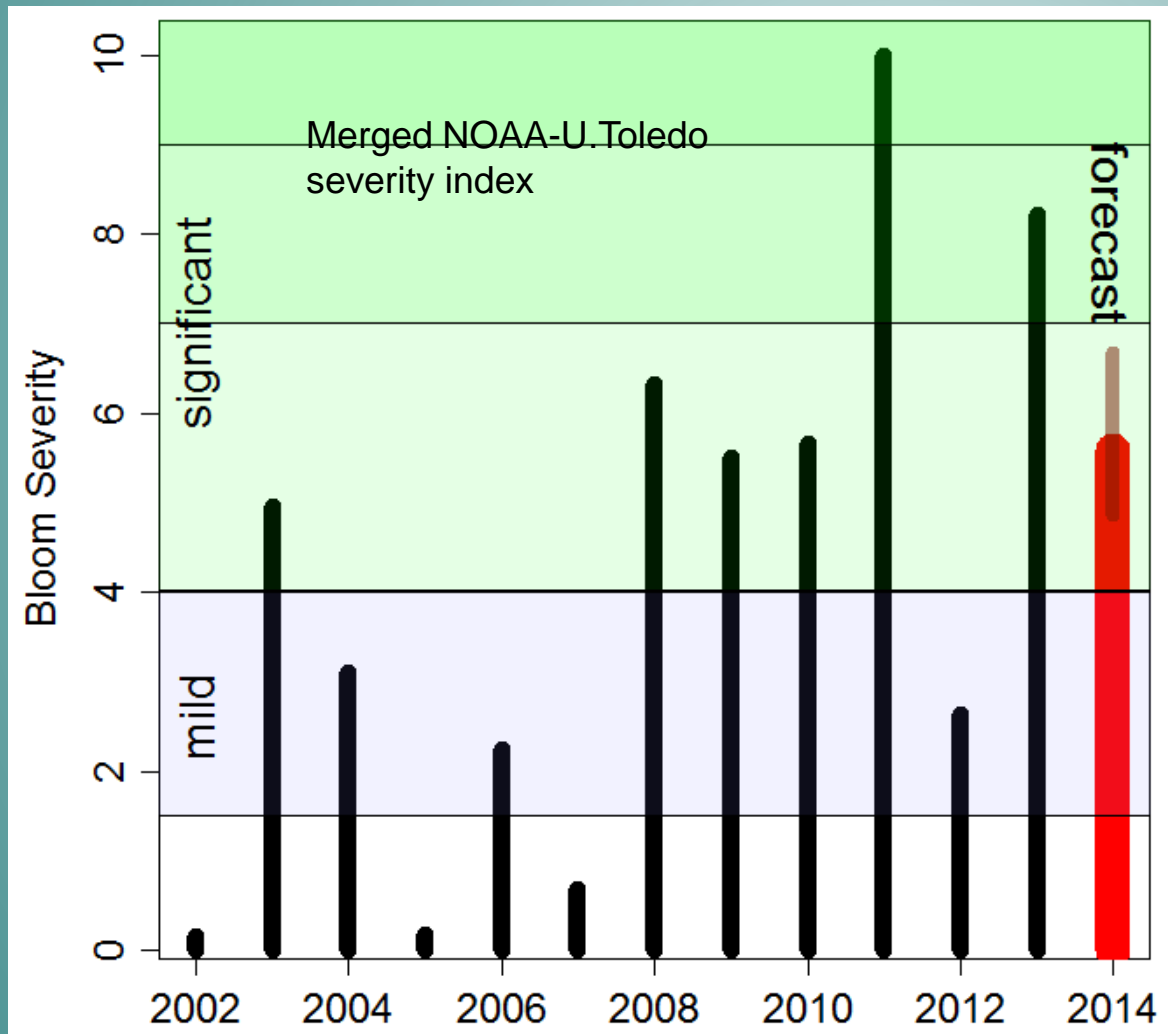
Thus far, 2015 spring
Total Phosphorus
load is less than
2011, 2013, 2014



Early season projection
may change if heavy
rains occur over the next
month

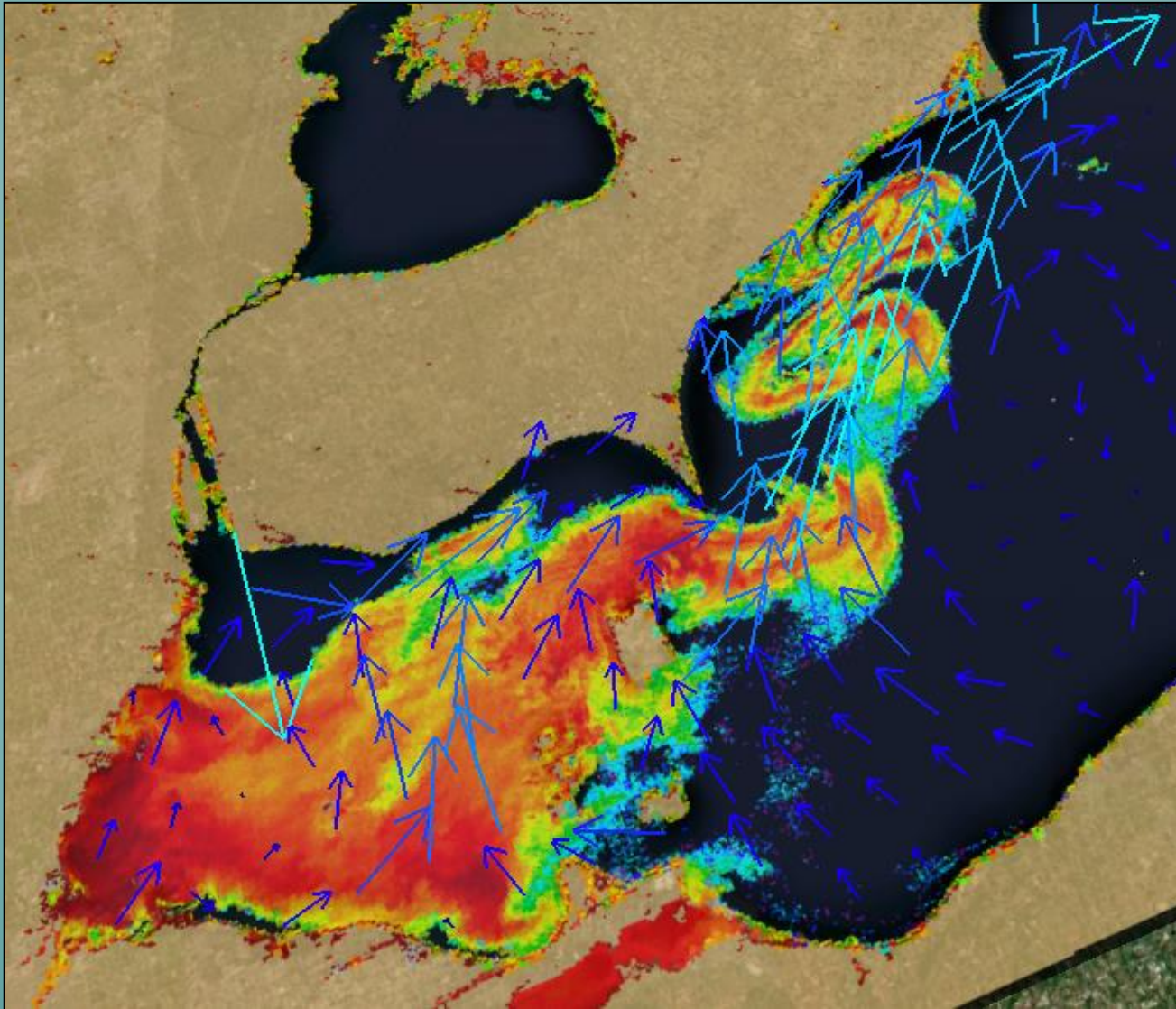


2015 Lake Erie Harmful Algal Bloom Forecast: July 9 at Stone Laboratory

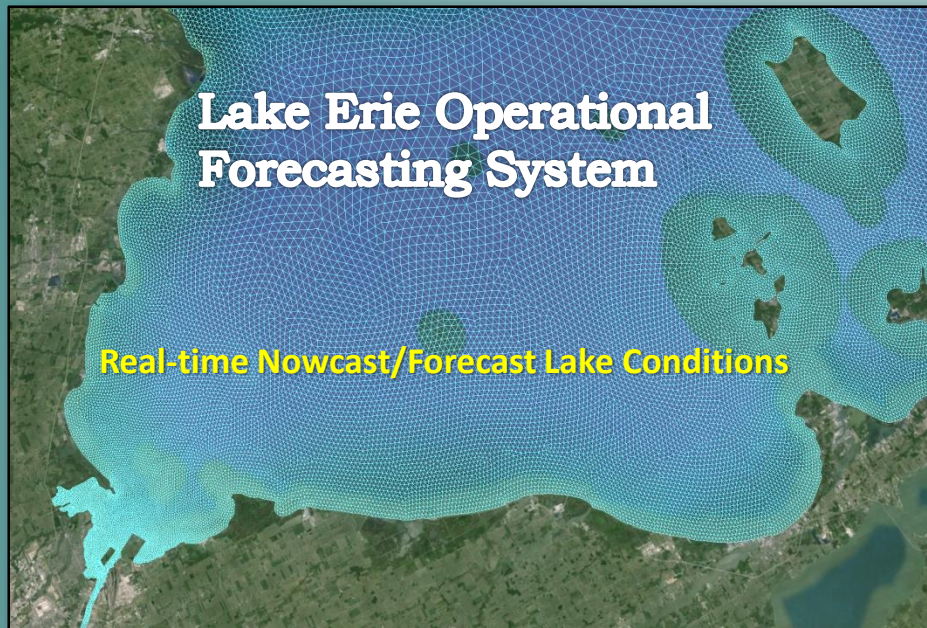


Includes all 2015
nutrient loading
data to date

The Future of HAB Forecasting: **"HAB Tracker"**



Future of HAB Forecasting

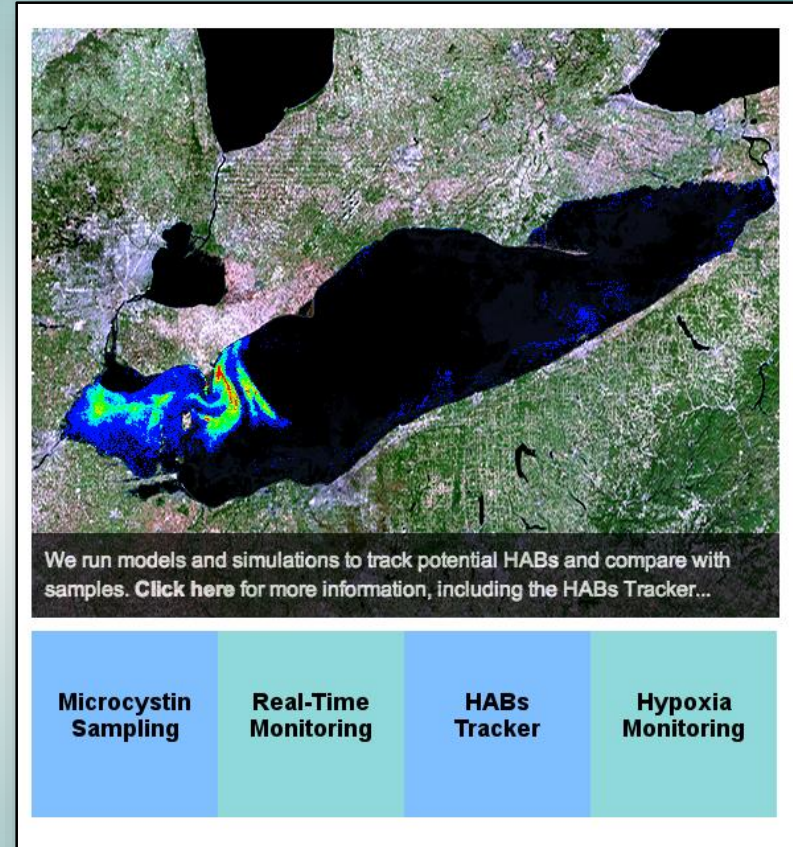


Improve real-time environmental forecasts

- currents, water temperature, waves
- beach-scale resolution (100 meters)

Daily 3D HAB Tracker forecasts

- Where will the bloom go?
- What is the extent (biomass)?
- Will it form a scum?

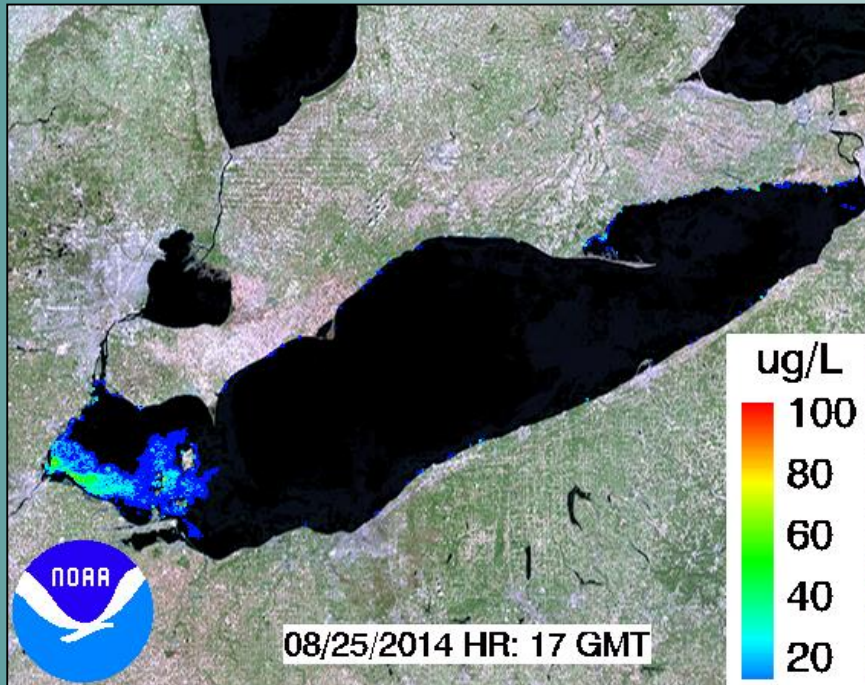


HAB Tracker

<http://www.glerl.noaa.gov/res/waterQuality/>

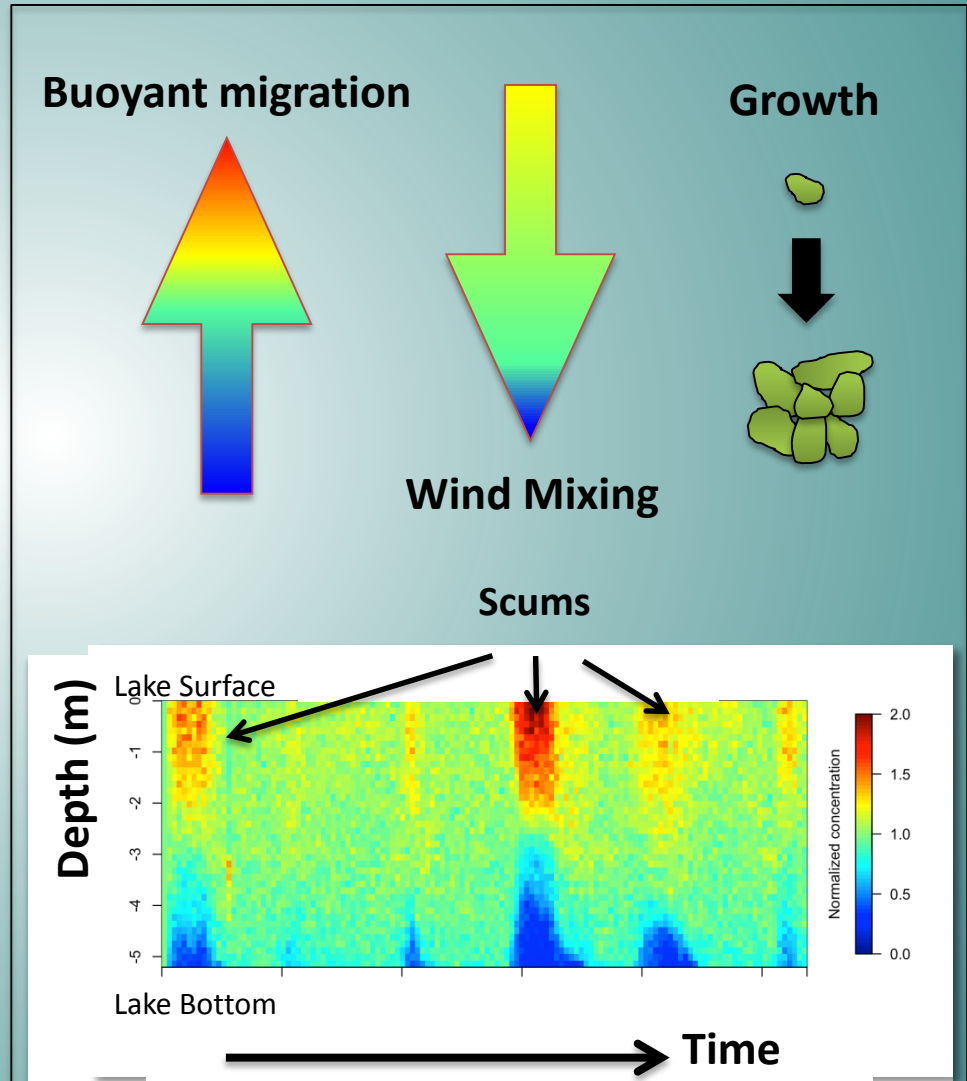
Future of HAB Forecasting

Daily 3D HAB Transport



Will it form a scum or mix into the water column?

Real-time Impacts





Online Resources

Web Sites:

<http://coastalscience.noaa.gov/research/habs/>

HAB Great Lakes hab-glakes@noaa.gov

<http://www.glerl.noaa.gov/res/waterQuality/>

HABs images

https://www.flickr.com/photos/noaa_glerl/sets/72157639592150973ABs

Current bulletin

http://www2.nccos.noaa.gov/coast/lakeerie/bulletin/bulletin_current.pdf

Bulletin satellite image (as geotiff)

http://www2.nccos.noaa.gov/coast/lakeerie/bulletin/current_image.tif



Questions

Follow up inquiries:

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Information Services Branch Chief

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734-741-2210

Slides and audio available for download: <http://go.usa.gov/3PGTT>